

- I. Project Title: Population and survival estimates of young-of-the-year Colorado pikeminnow in the middle and lower Green River
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- III. Project Summary: The Interagency Standardized Monitoring Program (ISMP) relies on catch per unit effort (CPUE) as an index of young-of-the-year (YOY) Colorado pikeminnow abundance. However, recent work casts some doubt on how well CPUE reflects population density. Haines et al. (1998) found only weak correlation between estimates of CPUE and abundance measured by capture/recapture methods. A longer series of data is needed to determine the true relationship.

Overwinter survival of YOY Colorado pikeminnow is an important parameter needed by the Colorado pikeminnow population model developed for setting management objectives (Crowl and Bouwes 1997). Haines et al. (1998) and Valdez et al. (1995) estimated overwinter survival, and found it usually ranged between 40 and 60 percent. A longer series of data, however, is needed to determine year to year variation and to relate survivorship to winter conditions. Fieldwork for this study

will end with FY99. A similar study involving population estimates and survival in the middle Green River will begin in FY00 (Evaluation of effects of stage fluctuations induced by hydropower operations on overwinter survival of young Colorado pikeminnow).

IV. Study Schedule:

- a. Initial year: FY98
- b. Final year: FY99

V. Relationship to RIPRAP:

V. Monitor populations and conduct research to support recovery actions.

V.A. Conduct research to acquire life history information.

V.B.1. Identify significant deficiencies in life history information and needed research.

VI. Accomplishments of FY99 Tasks and Deliverables, Discussion of Initial Findings and Shortcomings:

Task 1 - Make a population estimate and determine catch per unit effort in 20 mile reach of upper (rmi 320- 215) and lower (rmi 120-0) Green River in spring.

a. Make three sample passes. Mark approximately 400 age-0 Colorado pikeminnow within each 20-mile study reach. Give a unique batch mark for fish captured in five mile subreach (total of 12 different batch marks).

Status: This task was completed. The lower river study reach was located at river km 43-76 and called the Canyonlands site; the middle river reach was km 451-483 and called the Jensen site. Three passes were made through each site. Backwaters were seined and yoy Colorado pikeminnow were marked with colored elastomer and released. For each pass, the number of marked and unmarked fish captured were counted. The data are summarized in the appendix (Table 1).

b. Sample all backwaters and record backwater location, size, depth, and water temperature. Also record main channel water temperature and numbers of marked and unmarked fish captured on each sampling pass. Measure effort in m<sup>2</sup> seined.

Status: This task was completed. River mile index and backwater dimensions were recorded for each backwater seined. Main channel and backwater temperatures were sampled through the day. The number of seine hauls and yoy Colorado pikeminnow catch were recorded for each backwater. The number of m<sup>2</sup> seined was recorded for each backwater that met ISMP sampling criteria (i.e., first two backwaters in each 5-mile reach > 30 m<sup>2</sup> and > 1 foot deep). Data analysis has not yet been completed.

c. After completion of the spring estimate, conduct additional sampling for marked fish in 20-mile reaches downstream of each study site (without marking fish) to determine if emigration of marked fish occurs between fall and spring estimates.

Status: This task was completed for the lower section but not the upper section. So few fish were marked in the upper section in the fall that it was not worthwhile looking for them in the 20 miles below the study section.

d. Calculate number of age-0 Colorado pikeminnow occupying 20-mile study reaches, estimate seining catchability coefficients, and fish movement.

Status: The data is currently being analyzed. In the Canyonlands reach we recaptured 48 fish that were marked last autumn. These data are valuable because they allow use of Robust Design Models (RDM) for analysis of recapture data. RDMs can simultaneously use all of the data from the autumn and spring "mark-recapture sessions" to estimate abundance for each session and an apparent survival rate for the intervening period (winter) based on recapture data. Preliminary analysis with RDMs suggests that the overwinter survival rate may be much lower than the estimate calculated by dividing the spring population estimate by the estimate for the previous autumn. The difference between the two survival estimates is probably due to mortality and movement of marked fish out of the study reach during winter. Thus, comparison of the two survival rates provides a quantitative estimate of the importance of potentially violating assumptions of no marking-related mortality and closure, on population estimates. A record of the locations where autumn-marked fish were recaptured in spring has been compiled. These data can potentially be used to estimate emigration rates of marked fish during the winter period.

During spring sampling, three juvenile Colorado pikeminnow were captured having total lengths of 230, 240, and 252 mm. We suspect these fish were from the 1996 year class. Consequently, as with our autumn sample, we did not capture any Colorado pikeminnow produced during summer 1997. Historically, several age-1+ fish were always captured in the Canyonlands site during the course of our sampling. These data suggest that the magnitude of recruitment was small in the lower Green River from the 1997 year class.

Task 3 - Analyze data and write preliminary report by 15 Dec each year.

Status: Data have been partially analyzed; complete analysis will be finished by 15 April 2000.

Task 4 - Complete final report by 15 April 2000

Shortcomings: none

#### VII. Recommendations:

1. Capture-recapture is a workable method for making population estimates and studying survival of young of the year Colorado pikeminnow.
2. Overwinter survival is best studied by using recaptures in the spring resulting from fish marked and released in the autumn. Apparently there is considerable overwinter movement, making survival estimates derived by dividing spring by autumn population estimates suspect.

#### VIII. Project Status:

FY99 ends this project. A similar study involving population estimates and survival of young Colorado pikeminnow in the middle Green River will begin in FY00 (Evaluation of effects of stage fluctuations induced by hydropower operations on overwinter survival of young Colorado pikeminnow).

#### IX. FY 99 Budget

	Vernal	
	CRFP	LFL
A. Funds Provided:	\$33.0K	\$34.1K
B. Funds Expended:	\$33.0K	\$34.1K
C. Difference:	- 0 -	- 0 -

Recovery program funds spent for publication charges: -0-

X. Status of Data Submission (Where applicable):

Data will be submitted upon completion of final report 15 April 2000.

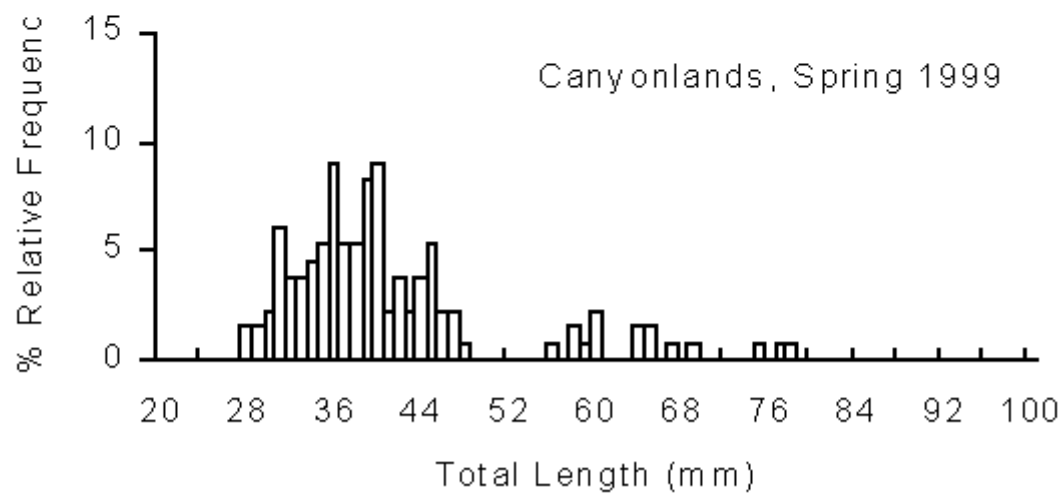
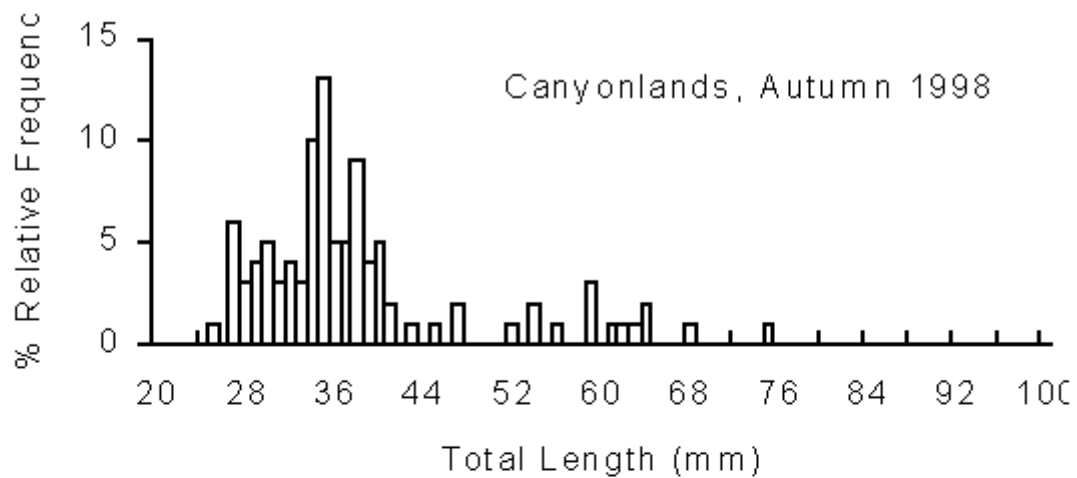
XI Signed: Bruce Haines 6 Dec 99  
Principal Investigator Date

## Appendix

Table 1. - Capture/recapture data for Jensen (km 451-483) and Canyonlands (km 43-76) study sites, Green River. j = sample occasion, M(j) = number of marked fish prior to sample, m(j) = number of marked fish sampled, u(j) = number of unmarked fish sampled, N = number of backwaters or low velocity channel sites sampled.

j	M(j)	m(j)	u(j)	Dates	N	MC	BA
Canyonlands							
Autumn 1998							
1	0	0	670	10/20-10/22	24		
2	666	131	263	10/23-10/24	21		
3	921	70	119	10/24-10/26	20		
Spring 1999							
1	0	0	488	04/20-04/21	15		
2	451	129	196	04/22-04/23	15		
3	636	158	85	04/24-04/25	14		
Jensen							
Autumn 1998							
1	0	0	134	09/28-09/30	31		
2	91	0	43	10/07-10/09	30		
3	132	2	150	10/21-10/27	46		
4	282	3	105	11/02-11/04	35		
Spring 1999							
1	0	0	25	04/26-04/28	25		
2	24	0	10	05/10-05/11	18		
3	34	0	3	05/12-05/13	11		

Note: Some unmarked fish captured on one pass were not available for recapture on subsequent passes because they were too small for marking (<30 mmTL) or died during marking.



Length-frequency histograms for age-0 Colorado pikeminnow in the Green River in Canyonlands National Park, Utah, autumn 1998 and spring 1999 ( $n = 100$  and  $n = 133$ , respectively).